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Cigarette Smoking is Associated with Unhealthy Patterns of Food Consumption, Physical Activity, Sleep Impairment, and Alcohol Drinking in Chinese Male Adults

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Abstract

Objectives—According to a recent national survey, tobacco use is a critical public health issue in China, with more than two thirds of Chinese males smoking. Findings in Western populations suggest that smoking may cluster with other health-risk behaviors. To explore these relationships in Chinese male adults, we utilized baseline data from the China Seven Cities Study (CSCS).

Methods—Male adults (N=12,122) were included. Smoking status was defined as never smokers, ex-smokers, current smokers, and current heavy smokers. Logistic regression was employed to investigate the association of cigarette smoking and patterns of food consumption, physical activity, and alcohol drinking.

Results—After controlling for age, socioeconomic status, and city residence, heavy smokers consumed significantly less vegetables, fruits, milk and other dairy products, spent significantly more time watching television, slept and exercised less, and got drunk or engaged in binge drinking more frequently compared to never, ex, or current smokers ($p<0.05$).

Conclusion—Findings suggest significant associations of heavy cigarette smoking with other health-risk behaviors in Chinese male adults, underscoring the need for tobacco control interventions for Chinese males.

Keywords

Cigarette Smoking; Lifestyles; Chinese Male Adults; Tobacco

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Ethical Standards:
The authors declare that the experiments comply with the current laws of the country in which they were performed.

Conflict of Interest:
The authors declare that they have no conflicts of interest.

INTRODUCTION

China is the world's largest producer and consumer of tobacco according to the report from the World Health Organization Framework Convention on Tobacco Control, making cigarette smoking the number one cause of preventable death in China (WHO, 2009). According to the 2010 Global Adult Tobacco Survey, 28.1% of the Chinese adult population, age 15 and older (roughly 350 million people), smoke tobacco products regularly (GATS, 2010, Xie et al., 2010). Smoking rates among Chinese men range between 50%-70%, while women accounted for about 2.4% of tobacco users' nation-wide (Ho et al., 2010, Ma et al., 2008). In addition, approximately 53% of non-smokers are exposed to second-hand smoke, raising concern for tobacco use in China (Shi et al., 2008; Yang et al., 1999; Yang, 2005; Yang et al., 2010a, b).

Cigarette smoking and passive smoking are key contributors to mortality resulting from major chronic diseases, such as cardiovascular disease, chronic respiratory disease, and cancer. The World Health Organization estimates that there are on average 3,000 tobacco related deaths per day throughout China, and approximately 1 million deaths per year (WHO, 2014, Peto et al., 2009, Gu et al., 2009). Furthermore, a growing body of literature indicates cigarette smoking adversely affects various facets of a smoker's life and behaviors (Mak et al., 2010, Zhang et al., 2006, Paavola et al., 2004, Koh et al., 2005). Current smokers are more dissatisfied with their quality of sleep, and have increased difficulty initiating and maintaining sleep compared with never smokers (Zhang et al., 2006). Cross-sectional and experimental studies have also found a higher risk of insomnia among adult smokers (Palmer et al, 1980; Riedel et al, 2004; Averina et al., 2005; Soldatos, 1980; Pomerleau, 2000).

Along with sleep impairment, nicotine may lead to appetite suppression in smokers, as well as poor taste and smell perceptions. In a seven-year longitudinal follow-up study of adult smokers, smoking predicted dietary behavior and alcohol use (Paavola, et al., 2004). Additionally, smoking negatively affects leisure time physical activity and predicts sedentary life style (Paavola et al., 2004, Koh et al., 2005). Smokers also consume more alcohol than non-smokers (Koh et al., 2005). Considering the high smoking prevalence among Chinese male adults, and limited prior research efforts on the adverse associations of cigarette smoking with other risk behaviors, we explored the relationships between smoking and other health-risk behaviors such as unhealthy patterns of food consumption, physical activity, sleep impairment, and alcohol drinking in Chinese male adults by analyzing baseline data from the China Seven Cities Study (CSCS), a longitudinal smoking prevention and health promotion study conducted in Mainland China.

METHODS

Data Sources and Sample

Data was retrieved from the baseline survey of a health behavior study conducted between October 2002 and December 2002 in seven of Mainland China's largest cities (*China Seven Cities Study*, *CSCS)*. The seven cities were located in four regions in China: the Northeastern (Harbin, Shenyang), Central (Wuhan), Southwestern (Chengdu, Kunming),

and Coastal (Hangzhou, Qingdao) regions. A stratified sampling strategy was adopted to randomly select middle, traditional high and professional high school samples in each city. In each city, districts with the highest, middle, and the lowest residential incomes were identified. Within each identified district, the middle and traditional high were grouped according to three levels of academic performance. One middle school and one traditional high school were randomly selected from each of the 9 (3 levels × 3 districts) clusters to participate in the study. One class each from grades 7, 8 (middle school), 10 and 11 (high school) were recruited for the study. For the professional high schools, only one school was selected from each district. These professional schools were matched across districts based on number enrolled, type of occupational training, and male/female student ratios. Two academic majors were randomly selected and students in each of the 10^{th} and 11^{th} grades in these majors were recruited. Parents of the students were also invited to participate in the study. Detailed design and sampling procedures were reported in detail elsewhere (Johnson et al, 2006, Xie et al, 2006 a, b). The study protocol was approved by the IRB at University of Southern California/Claremont Graduate University. Data were collected from 6,138 middle school students, 8,296 high school students, and 25,697 parents. The participation rates were 94.1% for middle school, 92.2% for high school and 82.8% for parents. In the present paper, a total of 12,582 male parents who completed baseline questionnaire survey were used for analysis. We further removed 460 cases with missing responses to the smoking questions and 83 participants who were not smoking daily, but met classification criteria for heavy smokers. The final analysis included 12,122 participants.

Measures

Education Attainment—Subjects' educational levels were surveyed in categorical increments ranging from illiterate to college diploma or higher. The attainment of education was collapsed into three categories: below high school, high school, and college or above.

Family Income—Monthly family income was determined by subjects' response to the question, "What is your total monthly family income from all sources?" The response options ranged from "<100 yuan/month" (<$12 USD/month) to ">10,000 yuan/month" (> $1,200 USD/month), and was collapsed into "≤500 yuan/month" (≤$60 USD/month), "501-2,000 yuan/month" ($61-240 USD/month), and ">2,000 yuan/month" (>$240 USD/ month).

Cigarette Use—The following two questions were asked in the questionnaire to assess cigarette use: "Have you ever tried cigarette smoking, even a few puffs?" (0= "no", 1= "yes") and "During the past 30 days, on the days you smoked, how many cigarettes did you smoke per day?" The responses included "I did not smoke during the past 30 days," "less than 1 cigarette per day," "1 cigarette per day," "2 to 5 cigarettes per day," "6 to 10 cigarettes per day," "11 to 20 cigarettes per day," and "more than 20 cigarettes per day." Based on responses to these two items, subjects were further classified as never smokers (lifetime never smoking), ex-smokers (ever smoking but not in the past month), current smokers (smoking less than 20 cigarettes/day in the past month), and current heavy smokers (smoking 20 cigarettes/day or more in the past month). Another question asked participants to report the number of days they smoked cigarettes in the past 30 days with responses of 0

day, 1-2 days, 3-5 days, 6-9 days, 10-19 days, 20-29 days and all 30 days. Additional analyses were conducted to cross-tabulate the distribution of this variable with heavy smoking status which we defined in the analysis. The majority of those classified as heavy smokers smoked cigarettes daily, and a total of 83 (5.9%) heavy smokers smoked less than 30 days in the past 30 days (i.e. 4 on 1-2 days, 7 on 3-5 days, 9 on 6-9 days, 22 on 10-19 days, and 41 on 20-29 days).

Selected Food Consumption—Three questions adapted from the US Behavioral Risk Factor Surveillance System (BRFSS), about selected food consumption were used to assess the dietary behaviors of the subjects (CDC, 1998). Subjects were asked to recall how frequently they had consumed certain foods during the past 30 days. The selected foods included fresh or cooked vegetables, fresh fruits and fruit juice, milk and dairy products. The response scale was “less than once a week,” “once a week,” “2-3 times a week,” “4-6 times a week,” “once a day,” and “two or more times per day.” The response scale was collapsed into “at least once a day” and “less than once a day” for the analysis.

Vigorous Physical Activity—An item asking about vigorous physical activity was adopted from similar measures used in the US Behavioral Risk Factor Surveillance System (BRFSS), (CDC, 1998) and the Continuing Survey of Food Intakes by Individuals (CSFII) (USDA, 1998). Subjects were asked to respond to the question, “How many times a week do you breathe hard and sweat for over 20 minutes while riding a bicycle, walking fast, jogging, dancing, or doing other exercise or hard physical labor?” The response scale ranged from “none” to “8 or more times.” The item was then dichotomized as “less than 3 times a week” and “at or greater than 3 times a week.”

Watching TV/Video—Information about time spent on watching TV and video was obtained by asking subjects, “How much time per day on average do you spend watching TV/video?” The response scales ranged from “none/hardly any,” “less than 30 minutes,” to “more than 4 hours.” The response was collapsed and dichotomized as 0 for less than or equal to 2 hours per day, or 1 for greater than 2 hours per day.

Alcohol Use—The following questions and item responses were used to assess drinking status: *Past Month Dinking*: “During the past 30 days, on how many days did you have at least one drink of alcohol?” (0= “0 days”, 1= all other responses).

Binge Drinking—“During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row on an occasion?” (0= “no”, 1= all other responses) (Naimi et al., 2003).

Drunk—“How many times during the past 30 days did you get drunk?” (0= “none”, 1=at least one time).

Sleep Impairment—Subjects were asked to recall how many hours of sleep they had on an average night. The response scale included “less than 5 hours,” “between 5 and 7 hours,” “between 7 and 9 hours,” “between 9 and 11 hours,” and “more than 11 hours.” Subjects

were classified as having sleep impairment if they reported less than 5 hours of sleep on an average night (National Sleep Foundation, 2013).

Statistical Analysis

Descriptive statistics (mean, standard deviation and percentage) were calculated to reflect the background characteristics of the sample. Sample characteristics were compared across smoking status by Chi-square tests. Logistic regression models were used to assess the odds of engaging in health-risk behaviors across levels of smoking status with adjustment for age, family income, parental education, and city residence. Statistical analyses were carried out using SAS (version 9.4; SAS Institute, Cary, NC).

RESULTS

General Characteristics

The general characteristics of subjects in our study are summarized in Table 1. The sample consisted of male adults with a mean age of 43±4.3 years. The proportions of subjects with education attainment of below high school, high school, and college or above was 38.4%, 34.3%, and 27.3% respectively. Participants' monthly family income distribution was 13.8%, 62.8%, and 23.5% for low, medium, and high income levels respectively. Overall, an estimated 67.3% of our subjects smoked cigarettes during the past month, of which, 16.4% smoked at least 20 cigarettes per day. The proportion of subjects who smoked during the past month (i.e. combined current regular smokers and current heavy smokers) was relatively bigger among subjects aged 45 years or younger (68.6% and 68.9% for age<40 and 40-44 years) than those aged 45 years and older (65.9% and 59.2% for age 45-49 and >=50 years), and the proportion for subjects aged 50 years or above was the lowest ($p<0.001$). However, there was no significant difference in the prevalence of heavy smokers across these age groups.

As education attainment increased, the prevalence of current heavy smokers deceased (13.0%, 10.5% and 8.9%, $p<0.001$). The prevalence of heavy smokers was not significantly different across levels of family income, however. Significantly fewer subjects with high family income (52.2%) than those from either low (57.5%) or medium (57.5%) income families smoked less than 20 cigarettes per day in the past month ($p<0.001$). Geographical differences of smoking status were apparent, with the prevalence rate of current regular or heavy smoking highest in Kunming and lowest in Hangzhou, with the other cities (Chengdu, Wuhan, Shengyang, Harbing, and Qingdao ($p<0.01$) falling in-between.

Food Consumption across Smoking Status

Results of the comparison between food consumption across smoking status are presented in Table 2. After adjusting for age, education, family income and city residence, current heavy smokers were significantly less likely than lifetime, never, former, or currently regular smokers to consume fruits and milk at least once a day. The likelihood of having fruit and milk at least once a day for current regular smokers were significantly lower than either lifetime never smokers or ex-smokers. In addition, compared to lifetime never smokers, ex-

smokers were 32% less likely to consume fruit and 23% less likely to consume milk at least once a day. ($p<0.05$).

Exercise, Watching TV/Video, and Sleep Impairment across Smoking Status

Table 3 illustrates results from adjusted analyses comparing exercise, watching TV, and sleep impairment across smoking status. Compared with lifetime never, ex-, and current regular smokers, current heavy smokers were less likely to have regular exercise more than 3 times per week, and more likely to watch TV/video more than 2 hours per day, or have less than 5 hours of sleep per day. In addition, ex-smokers reported spending significantly more time watching TV/video than did lifetime never smokers.

Drinking Behaviors across Smoking Status

As indicated in Table 4, ex-smokers, current regular, and current heavy smokers were more likely to report having had a drink, to have engaged in binge drinking, or have experienced drunkenness during the past 30 days than lifetime never smokers. Current regular or current heavy smokers tended to report having a drink or being drunk more frequently than did ex-smokers. Current heavy smokers had a significantly higher likelihood of having 5 drinks in a row than either lifetime never smokers or ex-smokers with an adjusted OR of 5.73(95% CI=4.67-7.03) and 2.49 (95% CI=2.03-3.06).

DISCUSSION

To the best of our knowledge, this study is the first to examine the associations between smoking and diet, physical activity, sleep impairment, and alcohol consumption among Chinese adult males. Our findings suggest a relationship between smoking and other health behaviors and these relationships are particularly salient among heavy smokers. Heavy smokers were found to consume fewer vegetables, fruit, milk, and other dairy products, spend more time watching television, have less regular exercise, and experience drunkenness or engaged in binge drinking more frequently than those who were never, ex-or current regular smokers. Moreover, heavy smokers were more likely to sleep less than 5 hours per day.

Our results suggest a link between smoking status and level of physical activity, which is consistent with findings from studies conducted among Western populations. In our analyses, current heavy smokers were significantly less likely to exercise more than 3 times per week, and were significantly more likely to engage in sedentary activities such as watching TV/video more than 2 hours per day compared to the other categories of smokers. These results are consistent with study results by Gauthier et al, where smoking status also predicted the level of physical activity (2006). A study conducted in Ontario, Canada, reported that current smokers were less active than former smokers, and former smokers were less active than never-smokers, and even physically active smokers were involved in lower MET (metabolic equivalent) value activities compared to physically active nonsmokers (Gauthier et al., 2006). These associations may be explained by individual differences in attitudes and beliefs. Studies have found that individuals who reported to see the greater negative consequences of smoking would also see the positive benefits of regular

exercise, and vice versa (Boyle et al., 2000; Unger, 1996). It has also been suggested that self-efficacy may impact the relationship between smoking and physical activity, as those with higher confidence in their ability to abstain from smoking also appear to have confidence in maintaining a regular exercise regimen (Boyle et al., 2000; Unger, 1996).

The associations between smoking status and diet intake identified in our analyses are similar to findings from studies conducted in both Asian and Western populations. In our study, heavy smokers consumed fewer vegetables, fruits, and milk compared with other smoking groups, which is consistent with other research findings, where smoking intensity is negatively related to consumption of fresh fruits and vegetables (Koh et al., 2005, Subar et al., 1990). Smokers in general have lower intakes of Vitamin C, folate, fiber, and Vitamin A than non-smokers, with a decreased intake of these nutrients as cigarette consumption increased. Smokers compared with non-smokers also consumed less high fiber grains, low fat milk, vitamin and mineral supplements (Koh et al., 2005, Subar et al., 1990).

Smoking status also predicted health risk behaviors in a study utilizing data from Chinese adults living in Singapore. Current smokers led a more sedentary lifestyles and drank more alcohol compared to never smokers, and current smokers had a dose-dependent decrease in intake of a wide range of antioxidants, vitamins, fiber, and calcium, compared to non-smokers. Current smokers were also found to have an increased consumption of dietary cholesterol and nitrosamines, compared to former smokers, who had similar dietary intakes compared to never-smokers or intermediary between current and never-smokers (Koh et al, 2005). The dietary changes associated with smoking could result from nicotine leading to appetite suppression and a decrease in taste and smell perception, which possibly makes fruits and vegetables less tempting. It can also result from the degradation of the gastro mucosal microcirculation in smokers (Komiyama, et al., 2013).

Smoking intensity and alcohol consumption were determined to have a positive association in our analyses, which supports other research findings. One study found that cigarette smoking was approximately three times higher among alcoholic users than the general population, and alcoholism is 10 times higher among smokers than nonsmokers, where heavy drinkers smoke the most (Rose et al., 2004). Another study found that 85% of smokers drank alcohol, and alcohol consumers were 75% more likely to smoke than non-smokers (Mukamal, 2006).

Alcohol consumption is one of the strongest facilitators of cigarette smoking, and it increases ad lib smoking behavior (Rose et al., 2004). Although there is ample literature establishing an association between alcohol consumption and tobacco use, the mechanisms explaining this relationship are not completely understood. It has been suggested that nicotine intake offsets the sedative or performance-impairing side effects of alcohol through the inhibition of glutaminergic transmission at NMDA and kainate receptors as well as activity of voltage gated calcium channels by alcohol, whereas nicotine facilitates glutamate release. Another possible explanation may be that alcohol enhances the rewarding effects of nicotine, since both are suggested to increase neuronal firing rates in ventral tegmental area dopamine cells, which increase dopamine release in the nucleus accumbens, a drug

reinforcement region, allowing a synergistic increase in rewarding effects (Rose et al., 2004).

The inverse relationship between smoking and sleep duration identified in our population is consistent with previous findings that heavy smoking leads to significant decrease in mean sleep duration (Palmer et al., 1980). This relationship has also been identified among youth smokers where a prior investigation of Chinese adolescent smokers found that current smokers were significantly more likely to experience difficulty initiating sleep and early morning awakening, which are both associated with insomnia, and that smoking can lead to sleep-impaired breathing symptoms such as snoring and difficulty breathing during sleep (Mak et al, 2010). Also, snoring and difficulty breathing during sleep was more likely to be experienced by experimental and current smokers than never smokers (Mak et al., 2010). In other research involving Chinese participants who were healthy smokers, it was found that overall the smokers had worse sleep quality compared to controls (Liu et al., 2013). The negative association between smoking and poor sleep quality has been attributed to less striatal dopamine transporter availability since striatal dopamine transporter availability is related to cognitive functioning and sleep quality (Liu et al., 2013)

Linkages between smoking and the clustering effects of health-risk behaviors in the Chinese adult population have been limited, despite the increasing concern about tobacco use. Our study data was collected from participants from a large population, involving the seven major cities in Mainland China, in an effort to reflect the diversity of the population. As such, the results may be more broadly applicable to other urban areas, which have continued to grow at a rapid pace since this data was collected. The results of this study contribute to a better understanding of health-risk behaviors associated with smoking in the urban Chinese adult population, which may aid in future intervention efforts. Despite the aged study data, which was collected in 2002, this study is one of the first efforts investigating the linkages between smoking and the clustering effects of health-risk behaviors in the Chinese population. Study results contribute to better understanding of smoking, and the health-risk behaviors associated with smoking in the Chinese population.

It is also important to consider the limitations of this study. As with all cross-sectional analyses, causation or bi-directionality cannot be determined. Additionally, it should be noted that this data was collected in 2002, and much has changed in Mainland China in the intervening years. This study analysis may provide an initial insight into the associations between the health risk behaviors and smoking, but more recent data are needed to track the developmental course of this association.

The study findings have certain implications for public health. The study results can potentially help minimize the effects of a myriad of other negative health and behavior outcomes associated with smoking and diet, physical activity, sleep, and alcohol consumption. The inverse association identified between heavy smokers and diet quality, sleep quality, and physical activity levels may be helpful in intervention and policy planning aimed to address tobacco use among the Chinese population. Based on our results showing heavy smokers are more likely to engage in unhealthy behaviors, it may be helpful to tailor interventions differently depending on how much an individual smokes. As this study cannot

attribute causation to any of the variables examined, future studies with a longitudinal design may be able to provide additional insight into these relationships.

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Table 1

General characteristics. (China, 2002).

%	Lifetime Never Smoker (n=1827)	Ex-Smoker (n=2140)	Current Regular Smoker (n=6816)	Current Heavy Smoker (n=1339)
Overall	15.1	17.7	56.2	11.0
Age (yrs)				
<40	14.5	16.9	57.5	11.0
40-44	14.5	16.6	58.1	10.8
45-49	15.1	19.0	54.4	11.5
>=50	18.7	22.1	48.3	10.9
Education (%)				
Below High Sch	12.4	15.4	59.2	13.0
High Sch	14.0	17.3	58.2	10.5
College or above	20.1	21.2	49.7	8.9
Family Income (%)				
Low	13.9	16.1	57.5	12.5
Medium	14.7	16.8	57.5	10.9
High	16.7	20.8	52.2	10.3
City Residence (%)				
Southwestern				
Chengdu	13.1	17.3	58.0	11.6
Kunming	11.5	16.0	60.4	12.1
East costal				
Hangzhou	16.1	21.9	53.8	8.2
Qingdao	16.4	19.1	54.3	10.3
Northeastern				
Shenyang	18.0	15.5	55.6	11.0
Harbing	18.9	15.8	55.6	9.6
Central				
Wuhan	11.3	19.1	55.4	14.2

Table 2

Comparison of food consumption behaviors across smoking status. (China, 2002).

	Lifetime Never Smoker	Ex-Smoker	Current Regular Smoker	Current Heavy Smoker
Vegetables				
Adj %	58.2	58.3	59.5	55.6
Adj OR (95% CL)	Reference	1.01(0.88, 1.15)	1.06(0.95, 1.18)	0.90(0.77, 1.04)
Adj OR (95% CL)		Reference	1.05(0.95, 1.17)	0.90(0.78, 1.04)
Adj OR (95% CL)			Reference	0.85(0.75, 0.96)**
Fruits				
Adj %	35.9	27.5	23.2	18.5
Adj OR (95% CL)	Reference	0.68(0.59, 0.78)**	0.54(0.48, 0.60)**	0.40(0.34, 0.48)**
Adj OR (95% CL)		Reference	0.79(0.71, 0.89)**	0.59(0.49, 0.70)**
Adj OR (95% CL)			Reference	0.74(0.64, 0.87)**
Milk				
Adj %	27.2	22.2	18.5	14.2
Adj OR (95% CL)	Reference	0.77(0.66, 0.90)**	0.61(0.54, 0.70)**	0.43(0.36, 0.53)**
Adj OR (95% CL)		Reference	0.80(0.71, 0.91)**	0.57(0.46, 0.69)**
Adj OR (95% CL)			Reference	0.71(0.59, 0.85)**

Adj %, Adj OR: % and Odds Ratio adjusted by age, education, family income and city residence. Adj% was calculated by generalized linear models implemented with the least-squared means procedure and Adj OR was derived from logistic regression.

* $p<0.05$;

** $p<0.01$

Table 3

Comparison of exercise, watching TV/video and sleep impairment across smoking status. (China, 2002).

	Lifetime Never Smoker	Ex-Smoker	Current Regular Smoker	Current Heavy Smoker
Exercise				
Adj %	24.4	25.3	26.4	19.8
Adj OR (95% CL)	Reference	1.05(0.89, 1.24)	1.11(0.97, 1.28)	0.77(0.63, 0.94)*
Adj OR (95% CL)		Reference	1.06(0.93, 1.20)	0.73(0.60, 0.89)**
Adj OR (95% CL)			Reference	0.69(0.58, 0.82)**
Watching TV/Video				
Adj %	25.2	28.7	34.3	38.8
Adj OR (95% CL)	Reference	1.20(1.04, 1.40)**	1.57(1.39, 1.77)**	1.90(1.62, 2.24)**
Adj OR (95% CL)		Reference	1.31(1.17, 1.46)**	1.59(1.36, 1.85)**
Adj OR (95% CL)			Reference	1.22(1.07, 1.38)**
Sleep Impairment				
Adj %	4.1	4.1	3.8	5.6
Adj OR (95% CL)	Reference	0.99(0.71, 1.37)	0.91(0.69, 1.20)	1.36(0.97, 1.92)
Adj OR (95% CL)		Reference	0.93(0.72, 1.20)	1.38(0.99, 1.92)*
Adj OR (95% CL)			Reference	1.50(1.14, 1.97)**

Adj %, Adj OR: % and Odds Ratio adjusted by age, education, family income and city residence. Adj% was calculated by generalized linear models implemented with the least-squared means procedure and Adj OR was derived from logistic regression.

* $p<0.05$;

** $p<0.01$

Table 4

Comparison of alcohol drinking behaviors across smoking status. (China, 2002)

	Lifetime Never Smoker	Ex-Smoker	Current Regular Smoker	Current Heavy Smoker
Past-month Drinking				
Adj %	56.6	75.2	84.9	84.7
Adj OR (95% CL)	Reference	2.4(2.06, 2.74)**	4.43(3.93, 4.99)**	4.32(3.60, 5.19)**
Adj OR (95% CL)		Reference	1.86(1.64, 2.11)**	1.82(1.51, 2.19)**
Adj OR (95% CL)			Reference	0.98(0.83, 1.16)
Binge Drinking				
Adj %	36.5	56.4	73.4	75.9
Adj OR (95% CL)	Reference	2.30(1.94, 2.73)**	5.00(4.33, 5.77)**	5.73(4.67, 7.03)**
Adj OR (95% CL)		Reference	2.17(1.88, 2.51)	2.49(2.03, 3.06)**
Adj OR (95% CL)			Reference	1.15(0.96, 1.37)
Drunk				
Adj %	20.8	34.8	57.0	60.1
Adj OR (95% CL)	Reference	2.06(1.65, 2.57)**	5.23(4.36, 6.28)**	5.99(4.69, 7.64)**
Adj OR (95% CL)		Reference	2.52(2.11, 3.01)**	2.88(2.27, 3.66)**
Adj OR (95% CL)			Reference	1.15(0.94, 1.40)

Adj %, Adj OR: % and Odds Ratio adjusted by age, education, family income and city residence. Adj% was calculated by generalized linear models implemented with the least-squared means procedure and Adj OR was derived from logistic regression.

* $p<0.05$;

** $p<0.01$